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09/672,455 09/29/00 ISHII

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EXAMINER

MMC1/0807

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ART UNIT

PAPER NUMBER

2872

DATE MAILED:

08/07/01

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No.

09/672,455

Applicant(s)

ISHII, TETSUYA

Examiner

Audrey Y. Chang

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 19 June 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 8-47 is/are pending in the application.
- 4a) Of the above claim(s) 8-34, 37, 38 and 43-47 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 35, 36 and 39-42 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 1.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Election/Restrictions

1. Applicant's election with traverse of species A, claims 35-36 and 39-42, in Paper No. 8 is acknowledged. The traversal is on the ground(s) that there is no unduly extensive or burdensome search required. This is not found persuasive because the various species involve different number of layers structure for the diffractive optical element that require different search. The search for each distinct species is mutually exclusive since the searches for two or four-layered structures are not required for the search for the three-layered structure. The applicant also fails to provide adequate reasons to support why there is no unduly extensive or burdensome search for all the species.

The requirement is still deemed proper and is therefore made **FINAL**.

2. Claims 8-34, 37-38, and 43-47 are withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected species, there being no allowable generic or linking claim. Applicant timely traversed the restriction (election) requirement in Paper No. 8.

3. Claims 35, 36 and 39-42 remain pending in this application.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 35 and 36 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The phrase "such that a phase shift function of the first relief pattern and a phase shift function of the second relief pattern are canceled out by each other" recited in claims 35 and 36 appears to be confusing, in error and indefinite since it is not clear what is being considered here as the "phase shift

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function". Claim 36 recites a mathematical expression: $\Delta N(\lambda) = \{ n_1(\lambda) - n_2(\lambda) \} + \alpha \{ n_2(\lambda) - n_3(\lambda) \}$ that describes the optical path length difference produced by the diffractive optical element however claim 36 also fails to identify what is being considered as the "phase shift function". If the cited phrase means $\Delta N(\lambda)$ equals zero then the term, $\{ n_1(\lambda) - n_2(\lambda) \}$, is considered here as the phase shift function. However this term can not be identified as the phase shift function it can only merely be referred to as difference in index refraction of the two regions. Clarifications are required.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claim 35 is rejected under 35 U.S.C. 102(b) as being anticipated by the patent issued to Knop (PN. 4,426,130).

Knop teaches a semi-thick transmissive and reflective sinusoidal phase grating structure that is comprised of a first transparent substrate layer (100) having refractive index of n_1 serves as the *first optical region*, a transparent layer (102) having refractive index of n_2 , serves as the *second optical region*, and a third transparent layer (108) having refractive index of n_3 , serves as the *third optical region*. Knop teaches that the phase grating structure has a first and a second phase grating relief patterns at the boundary (104) between the first and the second optical region and at the boundary (106) between the second and the third optical region, respectively (please see Figure 6). Knop teaches that each of the phase gratings is a sinusoidal phase grating that has an amplitude $2A$, which means the physical depth of each of the grating is $2A$, (please see Figure 1 and column 2, lines 50-61). Knop also teaches that the relief patterns of the phase gratings are essentially aligned with identical line spacing periodicity or pitch

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d, (please see Figures 1 and 6 and column 2, lines 52-53). By a simple calculation the optical path length difference produced by the phase grating structure is: $2A(n_1 - n_2) + 2A(n_2 - n_3)$. Knop teaches that the index refraction for the first and the third regions may be the same, (please see column 9, lines 1-2) this means the optical path length difference is zero and no phase shift will be produced by the grating structure. Knop further teaches that the phase grating structure may be reflective by backing up the first layer with a mirror such that the first layer is reflective in nature. This reference has therefore anticipated the claims.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claims 36 and 40-42 are rejected under 35 U.S.C. 103(a) as being unpatentable over the patent issued to Sakata (PN. 4,729,640).

Sakata teaches a liquid crystal light modulator device that is comprised of a first transparent substrate layer (3), serves as the *first optical region*, a liquid crystal layer (2), serves as the *second optical region* and a third transparent substrate layer (3) serves as the *third optical region* wherein two triangular gratings are formed at the interface between the first and the second optical region and at the interface between the second and the third optical region respectively, (please see Figure 28 B, column 25). The two triangular gratings are essentially aligned to each other and have identical depth. The optical path length difference produced by the gratings is of the form $d(n_1 - n_2) + d(n_2 - n_3)$ with d denotes the depth and n_1 , n_2 and n_3 denote the index of refraction for the first, second and third optical regions. Since Sakata teaches that the first and the third optical regions are of the same substrate, n_1 then equals to n_3 . This means ΔN or the optical path length difference is zero. Therefore there is no phase shift resulted by

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the grating structure. Figure 15, Sakata teaches that the substrate layer (3) and the liquid crystal layer (2) have different dispersion property over the wavelength range interested. But it does not teach that the term ΔN has the dispersion behavior cited. However since both the reference and the claims are desired to have no path length difference or no phase shift such dispersion behavior does not take effect since ΔN is desired to be zero. This modification is therefore an obvious matter of design choice to one skilled in the art to choose the desired optical materials for the optical regions.

With regard to the feature concerning the thickness of the grating, this reference does not teach explicitly that the gratings satisfy the cited condition for being a thin grating. However this condition is commonly known in the art for designing and identifying a thin grating. It would have been obvious to one skilled in the art to design the gratings to satisfy the criterion for the purpose of producing a thin grating structure.

With regard to the feature concerning the wavelength range, Sakata teaches that the modulation device with grating structure is operable within visible wavelength range between 400 nm to 700 nm. The middle wavelength within the range is 550 nm. The difference between the longest and shortest wavelength in the range is 300 nm and it is greater than 0.05 times 550 nm.

With regard to the feature concerning the first layer being reflective this reference does not teach such explicitly. However to make the device reflective by having a layer reflects the incident light is common practice in the art such modification would have been an obvious matter of design choice to one skilled in the art to make the device a reflection mode.

10. Claim 39 is rejected under 35 U.S.C. 103(a) as being unpatentable over the patent issued to Knop.

The semi-thick transmissive and reflective sinusoidal phase grating structures taught by Knop (details described for claim 35 above) has met all the limitations of the claims. This reference teaches that the grating structure is of semi-thick, which therefore does not meet the cited grating criterion for a

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thin grating. However since this cited grating criterion for thick and for thin grating is very well known in the art, to make the grating structure with thin structure which satisfies the cited criterion would have been an obvious matter of design choice to one skilled in the art for the benefit of making a thin grating structure.

Double Patenting

11. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

12. Claims 35, 36, and 39-42 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1, 3, and 4 of U.S. Patent No. 6,157,488. Although the conflicting claims are not identical, they are not patentably distinct from each other because the both sets of claims recite a diffractive optical element having three optical regions having two relief grating patterns formed at the interfaces. Although the claims in the cited patent call for a condition for reducing the wavelength dependency of a diffraction efficiency and the claims in the instant application call for canceling phase shift function, that appear to be different. However if the canceling phase shift function means the ΔN being zero it is the same as to reduce the wavelength dependency of the diffraction efficiency.

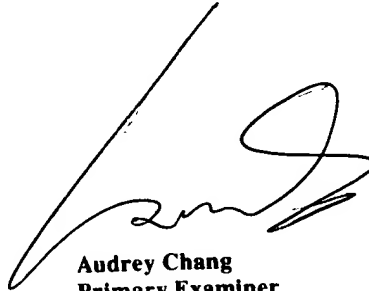
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13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Audrey Y. Chang whose telephone number is 703-305-6208. The examiner can normally be reached on Monday-Friday (8:00-4:30), alternative Mondays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Cassandra Spyrou can be reached on 703-308-1637. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

A. Chang, Ph.D.
August 3, 2001

A handwritten signature in black ink, appearing to read 'Audrey Chang', is written over a horizontal line.

**Audrey Chang
Primary Examiner
Technology Center 2800**